Beyond Pretty Trees and Tigers: The Role of Ecological Destruction in the Emerging Patterns of Poverty and People's Protests

by

ANIL AGARWAL

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FIFTH VIKRAM SARABHAI MEMORIAL LECTURE*

by

Anil Agarwal**

IT looks as if environment is an idea whose time has come. Newspapers give prominent display to environmental horror stories. Editorials demand better management of our natural resources. Government statements on the need to preserve the environment are now commonplace. Government programmes too are quite numerous and increasing in number day by day. There are massive schemes for afforestation, for instance. In the last four years, some 1,000 crore seedlings are said to have been distributed or planted. There are new laws for control of air and water pollution and for the conservation of forests. India has received plaudits all over the world for what it has done to preserve tigers. Nearly 3 per cent of India's giant land mass is now under protected national parks and wildlife sanctuaries, and there are demands to strengthen their protection and increase their area. Plan documents and party manifestoes are equally careful to mention the importance of environment.

But there is a major problem with this entire range of activities and concerns: it does not appear to be based on a holistic understanding of the relationship between environment and the development process taking place in this country. The programmes are *ad hoc*, without any sharp priority and there is too much of a policeman's attitude. They seem to be based on the belief that concern for the environment essentially means protecting and conserving it, partly from development programmes but mainly from the people themselves. There is little effort to modify the development process in a manner that will bring it in greater harmony with the needs of the people and with the need to maintain ecological balance, while increasing the productivity of our land, water and forest resources.

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**Dr. Anil Agarwal is Director, Centre for Science and Environment, New Delhi.

The environment is not just pretty trees and tigers, threatened plants and ecosystems. It is literally the entity on which we all subsist, and on which our entire agricultural and industrial development depends. Development can take place at the cost of the environment only up to a point. Beyond that point it will be like the foolish person who was trying to cut the very branch on which he was sitting. Development without a concern for the environment can only be development for the short-term. In the long term, it will become anti-development and it can go on only at the cost of enormous human sufferings, increased poverty and oppression. We may be rapidly approaching that point.

Amongst the hundreds of voluntary groups working at the micro-level within the country, there has been a remarkably rapid growth of interest in environmental problems. So rapid, in fact, has been this growth that sometimes we even loosely tend to describe it as the beginnings of an environmental movement in the country. During the last year, in the process of producing a citizens' report on the State of India's Environment, we have had the fortune and opportunity to interact with these groups and learn from them their growing understanding between environment and development and it is this understanding that I would like to share with you this evening.

There are hundreds of field-level groups in the country today taking a keen interest in environmental issues and their experiences and interests are extremely diverse: while some are interested in preventing deforestation, there are others which are only interested in afforestation. There are many which want to prevent the construction of one dam or another. There are others who want to prevent water pollution. There is the famous Chipko Movement in the U.P. Himalayas, probably the oldest and most famous of all the groups, which has played a major role in bringing the issue of deforestation to the fore of public opinion. And now there is its counterpart in the south, the Apikko Movement in the Western Ghats of Karnataka. Dams like the Silent Valley and Bedthi have already been stopped because of strong people's protests and now the well-known social worker Baba Amte, who has never before been involved in any campaign all his life, is leading a major campaign against the proposed Bhopalapatnam and Inchampalli dams on the borders of Madhya Pradesh, Andhra Pradesh and Maharashtra. The Kerala Sastra Sahitya Parishad has had a long acrimonious battle over the pollution of the Chaliyar River in Kerala by a rayon mill. The India Development Service finds itself embroiled in another case of river pollution by a rayon mill in Karnataka. Meanwhile, the Shahdol Group has worked for long against the pollution of a river in the Shahdol district by a paper mill. There is, of course, the Mitti Bachao Abhiyan to organize the farmers against the water-logging caused by faulty irrigation systems.

While all these are relatively well known groups and have attracted varying degrees of media attention, there are many, many others in the country who are doing excellent work in mobilizing people, both to prevent further ecological destruction, often in the face of determined government policies, and to bring about ecological regeneration. One thing, however, that binds most of these groups is their concern to put the environment at the service and the control of the people, the people being defined as the local communities who live within that environment.

Environmental protection *per se* is of least concern to most of these groups, including the well known Chipko Movement, for example. Their main concern is about the use of the environment: how should the environment be used and who should use it and benefit from it. It is this growing understanding of the relationship between the people and their environment, born out of a concern for a more equitable and sustainable use of the environment, that is probably the most fascinating development for a reporter of events like me.

ENVIRONMENTAL DESTRUCTION BY THE RICH

To understand the nature of the environmental problems in India, it may be useful to compare and contrast certain environmental trends and concerns in India with those in the West, especially since the environmental concern first began in the Western world and since many groups in India, including political parties, have for long dismissed the environmental concern as a petty Western concern. There has always been this argument that too much concern for the environment can only retard economic and industrial development. The UN Conference on the Human Environment held in Stockholm in 1972 was the landmark conference that created worldwide consciousness about the environment. No UN conference has ever been able to collect so many luminaries at one place.

Many delegations from developing countries attending that conference had argued that the solution to environmental problems lay in economic development. 'Smoke is a sign of progress', the Brazilian delegation had thundered, then representing a country witnessing an economic boom. Our own Prime Minister, Mrs. Indira Gandhi, who made a major impression on the conference, is still remembered for her off-quoted statement: 'Poverty is the biggest polluter'. In all those who came from the Third World, both leftists and rightists, there was a sneaking suspicion that the Western countries may be up to some trick. The West may simply be pushing the environmental concern on to an unsuspecting Third World to retard its technological modernization and industrial development. It was even argued that having got their riches and their affluent lifestyles, W esterners were now simply asking for more affluence: clean air, clean water, and large tracts of nature for enjoyment and recreation, many of which were going to be preserved in the tropical forests and savannas of Asia, Africa, and South America.

But exactly ten years later when the UN organized a meeting to commemorate the Stockholm conference, few non-governmental groups from the Third World were prepared to argue in favour of the development process as it is. The Third World today faces both an environment crisis and a development crisis, and both these crises seem to be intensifying and interacting to reinforce each other. On the one hand, there does not seem to be any end to the problems of inequality, poverty and unemployment, the crucial problems that the development process is meant to solve. On the other, environmental destruction has grown further apace. But what is interesting is that while many environmental problems, especially those related to air and water pollution, have tended to become less severe in many parts of the industrialized world, because of the introduction of highly capital-intensive pollution control technologies, these problems have continued to grow and become critical in many parts of the developing world. In other words, while the economic development process in the world is only worsening our environmental problems, it is tending to solve them in the West. Michael Heseltine, then Minister of Environment in the anti-environment government of Mrs. Margaret Thatcher, even went so far in a UN meeting in 1982 as to say that all environmental problems in the West have been solved and they now remain mainly in the Third World.

Heseltine indeed had a point. London, for instance, has not seen for years any of those smogs it saw regularly in the 1940s and 1950s, which led to thousands of deaths annually, and the Thames now even boasts of salmon. But Michael Heseltine, like all representatives of vested interests, was only hiding something of deep significance: the role of the Western World in destroying the Third World environment.

Very simply speaking the major environmental problems in the West are those arising out of waste disposal-problems of air and water pollution and of disposal of highly toxic, industrial and nuclear wastes. Though problems of acid rain have definitely increased and there does not yet seem to be any solution to the problem of toxic wastes, it is true that some cities and rivers do look cleaner.

In the Third World, however, as its own industrialization proceeds, these water disposal problems are getting worse day by day but they are still not the major or only environmental problems. In the Third World, the major environmental problems are clearly those which arise out of the misuse of the natural resource base—out of the misuse of soils, forests and water resources. These problems are created to a great extent because of the pressure to produce raw materials for modern industry. The Third World's environment not only provides raw materials for its own industries but also for the industries of the West.

For instance, the Japanese and Western timber industries have been the biggest source of forest destruction in Southeast Asia. Having turned countries like Thailand from net exporters of wood into net importers of wood, Japanese companies are now turning to the last great wooded frontier of the world: the Amazon basin of South America.

The food needs of the Western world have equally played havoc with the lands of the Third World. No statistics on this are available, but if someone did collect them, I am sure we will find that despite the worldwide process of decolonization, there is today many times more land being used in the developing world to meet the food needs of the western countries than in the 1940s, before the process of decolonization began. More than a quarter of all Central American forests have been destroyed since 1960 for cattle ranching; 85 to 95 per cent of the beef produced as a result has gone to the US while domestic consumption of beef in Central America has fallen dramatically. In the US this beef has been mainly used to make tinned and pet food and cheap hamburgers because the Central American beef is half the price of the grass-fed beef produced in the US. The price of the Central American beef does not represent its correct ecological cost. Cattle ranching has proved to be the worst form of land use for the fragile soils on which these tropical moist forests existed. Within 5 to 7 years their productivity dropped dramatically and cattle ranchers have had to move on.

The Sahelian drought of 1968-74 which hit the world headlines and claimed the lives of approximately 1,00,000 nomadic people was caused by nothing less than the French colonial policy to drive these countries into peanut farming to secure its own source of vegetable oils. Through heavy taxation policies, the French colonial authorities forced the West African peasants to grow groundnuts at the expense of subsistence crops. Groundnut cultivation rapidly depleted the soil. It soon spread to traditionally fallow and forest zones and encroached on land previously used for grazing, upsetting the delicate balance between the farmers and the nomadic herders. The expansion of groundnuts was encouraged by artificially high prices but when the US soya production began to hit the European market and vegetable oil prices began to fall, the newly independent West African countries had no alternative but to increase the groundnut area to keep up their foreign exchange reserves. As this area increased by leaps and bounds under the pressure of government policies, the nomads were slowly pushed further and further north into the desert, for which they were not prepared, their traditional relationships with the settled farmers having been totally disturbed. When the long period of drought set in and thousands of animals and human beings began to die, the nomads and their over-grazing was blamed. Nobody blamed the French or the Sahelian elite which worked hand in glove with the French.

In our own country, the first major attack on the forests of the Northeast came with the establishment of tea plantations. The current over-fishing on India's coasts, as on the coasts of almost all south-east Asian countries, is taking place because of the heavy demand for prawns in Western and Japanese markets. This over-fishing is leading to considerable tensions between traditional fisherfolk and trawler owners, and violent encounters between the two are regularly reported. Recently, Indonesia completely banned the operation of trawlers from its coastal waters, and several countries including India have set up regulations to prevent trawler operators from fishing in the first few kilometres from the coast. This zone is reserved for the traditional fisherfolk. But policing trawlers over such an extensive coastline is an expensive proposition and regulations are, therefore, seldom observed or enforced. The export of frogs' legs to cater to the palates of Western consumers and its impact on the agricultural pest populations in affected areas is now a well known story.

The pattern of environmental exploitation that we see on the global scale simply reproduces itself on the national scale. Exactly what the Western industry does to the Third World environment, the Indian industry does to the Indian environment. Nearly half the industrial output in India is accounted for by industries which can be called biomass-based industries: that is, industries like cotton textiles, rayon, paper, plywood, rubber, soap, sugar, tobacco, jute, chocolate, food processing and packaging, and so on. Each of these industries exerts an enormous pressure on the country's cultivated and forest lands. They need crop lands, they need forests, and they need energy and irrigation.

The Indian paper industry has ruthlessly destroyed the forests of India. Paper companies in Karnataka, having destroyed all the bamboo forests, are now getting their raw materials from the last major forested frontier of India: the Northeast. The government's own public sector paper companies are coming up in the North-east itself. The Andhra Pradesh government has meanwhile set its sights on the forests of Andamans and Nicobar Islands for a paper mill that it wants to build in Kakinada. The shortage of raw materials for wood pulp has already forced the government to liberalize import of pulp for the country's paper industry, thus, adding to the pressure on the forests of other Third World countries.

The first lesson is, therefore, clear: the main source of environmental destruction in the world is the demand for natural resources generated by the consumption of the rich (whether they are rich nations or rich individuals and groups within nations) and because of their gargantuan appetite, it is their wastes mainly that contribute to the global pollution load.

THE POOR AND THEIR ENVIRONMENT

The second lesson, however, is that it is the poor that are affected the most by environmental destruction. The field experience of voluntary groups shows clearly that eradication of poverty in a country like India is simply not possible without the rational management of our environment and that conversely environmental destruction will only intensify poverty. The reason is simple though seldom recognized. The vast majority of the rural households meet their daily household needs through biomass or biomass-related products, which are mostly collected freely from the immediate environment. In short, they live within nothing other than a biomass-based subsistence economy. Food, fuel (that is, firewood, cowdung, crop wastes), fodder, fertilizer (that is, organic manure, forest litter, leaf mulch), building materials (that is, poles, thatch), herbs and clothing are all biomass products. Water is another crucial product for survival. Water is not biomass itself, but its availability is closely related to the level of biomass available in the surrounding environment. Once the forest disappears, the local pond silts up, the village well dries up, and the perennial stream gets reduced to a seasonal one. The water balance gets totally upset with the destruction of vegetation: in a monsoonal climate like ours with highly uneven rainfall over the year, it means greatly increased runoff and floods during the peak water season and greatly increased drought and water scarcity in the lean dry season.

The magnitude of India's dependence on biomass for meeting crucial household needs can be appreciated by looking at the energy situation. We as Indians love to point out that India has the world's tenth largest industrial output, or something like that. But even then over 50 per cent of the fuel consumption in India is for such a fundamental activity for survival as cooking. In developed countries, cooking consumes less than 100 per cent of total national fuel consumption.

But even more important for India is the fact that over 90 per cent of the cooking fuel in India is biomass: that is, firewood, cowdung and crop wastes. Even urban households are heavily dependent on firewood as fuel. Few people, energy planners and government officials alike, had any idea until recently of the dimensions of the rural-urban fuelwood trade. Annual urban purchase of fuelwood are well over Rs. 500 crores in India. Over the last ten years, Madhya Pradesh, the only state left in the heart of India with any reasonable degree of forest cover, has emerged as a major supplier of fuelwood to the cities of north and western India. But as the state gets more and more deforested every year, fuelwood prices have been rising within M.P. itself. Madhya Pradesh had now become India's first state and probably the world's first state too, to ban the export of firewood. As a result, Delhi, which uses about Rs. 15 crores worth of firewood on the retail market, is now getting less firewood, and an increasingly higher proportion from as far away as Assam, the same place from which paper mills are now getting their bamboo. Firewood prices in Delhi are today higher than ever before and according to FAO figures are amongst the highest in the world. This firewood is used by the poorest of the poor in Delhi, by construction workers and others, and when the effective heat provided by firewood is compared to kerosene, because of the low efficiency *chulhas* in which firewood is used, firewood becomes four to five times more expensive than kerosene. LPG, incidentally, a fuel used by the richest sections of the society and supplied entirely by government sources, is the most convenient and cheapest fuel available. Which state will be the next to ban firewood exports is anyone's guess? What happens when Assam also says no?

Biomass resources not only meet crucial household needs but they also provide a range of raw materials for traditional occupations and crafts and are, hence, a major source of employment: firewood and cowdung are important sources of fuel for potters; bullock carts and catamarans are made from wood; bamboo is a vital raw material for basket weavers, and so on. Traditional crafts are not just being threatened by the introduction of modern products but also by the acute shortage of biomass-based raw materials. A study from the Indian Institute of Science—the first in India on the changing market of bullock carts—reports that people in Ungra village in Karnataka can now no longer afford to buy new bullock carts with the traditional wooden wheel because wood has become extremely expensive. A recent report from the Murugappa Chettiar Research Centre from Madras reports that traditional fisherfolk now find it very difficult to make new catamarans because the special wood they use is extremely scarce and expensive.

Several reports from all over the country—from Madhya Pradesh, Maharashtra and Tamil Nadu—portray the extreme difficulty of hundreds of thousands of basket weavers in eking out a bare existence because of the acute shortage of bamboo. In the Bhandara and Chandrapur districts of Maharashtra, nearly 70,000 mat and basket weavers have been protesting against the discriminatory prices and small quota of bamboos given to them whereas big paper mills have been leased out large bamboo forests.

In Karnataka, Madhav Gadgil undertook a study of the use of the state's bamboo forests by paper mills, after a series of protests by basket weavers. Gadgil found that whereas bamboo was available to paper mills at Rs. 15 a tonne it was available to basket weavers and other amall bamboo users in the market at Rs. 1,200 per tonne. Social activists in Saharanpur have pointed out to the travails of the *baan* makers who have now been deprived of their earlier sources of *bhabhar* grass. The U.P. Forest Development Corporation discriminates in favour of paper mills and this policy has turned thousands of these *baan* workers into destitutes, landless labourers and urban migrants. Wood is now difficult to get for making even agricultural implements like the plough, especially wood that has been traditionally used for these implements. Few people know that one of the things that led to the Chipko movement was the anger of the local people over the Forest Department's refusal to provide ash wood, wood that has been traditionally used for making ploughs, whereas the Forest Department happily allocated the same wood to sports goods manufacturers.

Even biomass resources like thatch have become so difficult that maintenance and repair cycles of mud and thatch huts have increased considerably. A government report from Bastar, of all places, as it is still one of the heavily forested districts in the country, points out to a village where no new hut has been built over the last two decades because the entire area around the village has been deforested. Traditional mud roofs have almost disappeared from many parts of the country because of the large quantities of timber needed by them. They are being replaced by tiled roofs, but baking of tiles still requires large quantities of firewood.

Fodder is another vital resource that is in acute shortage. With only 2.45 per cent of the world's land mass, India supports 15 per cent of its cattle, 52 per cent of its buffaloes, and 15 per cent of its goats, and these animals play an extremely important role in the integrated system of agriculture and animal husbandry that Indian farmers practise. Shortage of fodder, especially from public lands, means, as a study from the tribal areas of Gujarat shows, that poor landless households and marginal farmers do not benefit much from the milk co-operatives and animal improvement schemes in the region.

In such a situation where millions of people are heavily dependent on biomass sources for their daily existence, the destruction of the environment or any policy that reduces access to biomass resources like the proposed forest bill will have an extremely adverse impact on the daily lives of the people.

THE TRANSFORMATION OF NATURE

Despite this near-total reliance on biomass resources for bare survival, nature in India has steadily undergone a major transformation. There are two major pressures operating on the country's natural resources today. The first, generated by population growth and thus by increased household demand for biomass resources, has been widely talked about. The poor often get blamed for the destruction of the environment. But the second set of pressures, generated by modernization, industrialization and the general penetration of the cash economy, are seldom talked about even in policy making circles.

Modernization affects nature in two ways. Firstly, it is extremely destructive of the environment in its search for cheap biomass-based raw materials and in its search for cheap opportunities for waste disposal. Unless there are strong laws which are equally strongly implemented, there is no attempt made to internalize environmental costs, both public and private industrialists prefer to pass them on to the society. State governments are also happy to give away large tracks of forests for a pittance and throw water pollution control laws to the winds to get a few more factories.

Other than the destruction of the environment, modernization affects nature in yet another way: this is by steadily transforming the very character of nature. In physical terms, the tendency is to reduce the diversity in nature and transform it into a nature that is full of high-yielding monocultures. The ecological role of the original nature is also usually disregarded in this transformation. In social terms, the transformation is generally away from a nature that has traditionally come to support household and community needs and towards a nature that is geared to meet urban and industrial needs, a nature that is essentially cash generating. Excellent examples of such transformations are the pine forests in place of the old oak forests in the Himalayas, the teak forests in place of the sal forests in the Chottanagpur Plateau, eucalyptus plantations in place of natural forests in the Western Ghats and now the proposals to grow oil palms in place of the tropical forests in the Great Nicobar Islands. Both these phenomena—the destruction of the original nature and the creation of a new, commercially oriented nature—have been taking place simultaneously in the Indian environment and on a massive scale.

The effect of this massive environmental change has been disastrous for the people, especially when we realize that in a country like India, where on one hand we have an extremely high level of poverty and on the other a reasonably high level of population density, there is hardly any ecological space left in the physical environment which is not occupied by one human group or another for its sustenance. Now, if in the name of economic development, any human activity results in the destruction of an ecological space or in its transformation which benefits the more powerful groups in society, then inevitably those who were earlier dependent on that space will suffer. Development in this case leads to displacement and dispossession and will inevitably raise questions of social injustice and conflict. The experience of microlevel groups shows clearly again that it is rare to find a case in which environmental destruction does not go hand in hand with social injustice, almost like two sides of the same coin.

Let us look at a few cases of how the destruction of nature has affected the lives of people. In one very dramatic area where government policies have consistently increased conflicts is forests. The entire tribal population, and millions of other forest dwelling people depend on the forests for their very existence. Destruction of forests has meant social, cultural and economic destruction of the tribal populations in particular. Beginning with the British and continuing with free India, the government has decided to control the forest resource itself, leaving little or no control in the hands of the forest dwellers. The government control over forests has definitely meant a reallocation of forest resources away from the needs of local communities and into the hands of urban and industrial India. The end result is both increased social conflict and increased destruction of the ecological resource itself.

Yet another major component of the country's physical environment is grazing lands. The destruction of the grazing lands has meant enormous hardships for poor people, especially for the nomadic groups in the country. Few people know that India has nearly 200 castes engaged in pastoral nomadism, which when added up number up to 6 per cent of India's population. India is unique in the world in terms of the diversity of animals associated with pastoral nomadism. There are herders of camels in Rajasthan and in Gujarat, of donkeys in Maharashtra, of yaks in Ladakh, of pigs in Andhra Pradesh and even of ducks in southern India. Sheep, goats and cattle are of course the main animals used for nomadism.

A number of factors, including land reforms and development programmes which have promoted expansion of agriculture on to marginal lands, have steadily led to an erosion of grazing lands. The Rajasthan Canal is a fine example of a government programme that has transformed extensive grazing lands into agricultural lands. No effort was made by the government to ensure that the nomads who used these grazing lands earlier would benefit from the canal on a priority basis. In almost every village, the panchayat lands, traditionally used as gauchar lands, have been encroached upon by powerful interest groups and privatized. Nomadic groups have been increasingly impoverished over the last 30 years and an ever increasing number is being forced to give up their traditional occupations, to become landless labourers or urban migrants.

Riverine fisherfolk constitute another group that has suffered immensely with environmental destruction. Riverine fisheries are being seriously affected with increasing water pollution. Large scale fish kills are regularly reported. In the 158 km stretch of the Hooghly, the average yield of fish is just about a sixth in the polluted zones as compared to the unpolluted zones. Growing water pollution is, thus, affecting thousands of riverine fisherfolk in the country but little data is available on their plight. Rivers have now become a resource for urban and industrial India to be used as cheap dumpyards for their wastes and all this is sanctioned in the name of economic development.

The new, commercial nature that is being created is also of little help to village communities and their daily needs. There are people's protests in many parts of the country against the conversion of oak forests into pine forests and of sal forests into teak forests. Neither pine nor teak is of any interest to local communities. In the Singhbhum area of Bihar there is even a movement to destroy the new teak forests. Equally, there is a strong protest in Karnataka against the planting of eucalyptus on farmers' fields.

The planting of eucalyptus on farmers' fields and even on so-called barren fields is an excellent example of the adverse biomass conversion, adverse to the people, promoted by modernization. What happens to the poor people when eucalyptus is planted on a farmers' field? We have a concrete example from a village is Punjab, where a rich farmer with over 100 hectares of land and a former Governor, has stopped growing cotton and has switched to eucalyptus. As long as he grew cotton, enormous quantities of cotton sticks would be available for the landless labourers in the village to use as fuel. Because of the shortage of firewood, crop wastes from the landlord's fields are the major and almost the only source of fuel for these poor landless villagers. Now with eucalyptus growing, their main source of fuel has dried up, putting them in a precarious position. This is a case where afforestation has actually created a fuel famine for the neediest community.

What happens when eucalyptus is grown on a barren piece of land? Usually no land is barren unless of course it is highly eroded in which case even eucalyptus cannot be grown on it. Generally barren lands have large quantities of weeds growing on them. With the destruction of our original vegetation, a few aggressive weeds like Lantana, Parthenium and Ipomoea have literally started taking over the country. None of these weeds is palatable to animals and they therefore survive the pressure of grazing.

If we look at the firewood statistics in the country, we find there is a huge gaping hole in these statistics. The officially produced firewood does not account for even one-fifth of the total estimated demand of some 130 million tonnes of firewood a year. When this was first discovered in the early 1970, it was immediately concluded that the rural people must be stealing wood from the forests on an enormous scale. Later, however, it was found that over three-quarters of the fuel used in the rural areas is in the form of twigs and little branches and there need not be any felling of trees to get this wood. But even today we do not know what vegetation is actually providing this massive quantity of twigs and branches. My guess is that weeds are now playing an extremely important role in the vital supply of cooking fuel for the poor.

A weed is defined as a plant which has no economic value but in the socio-economic reality of India, Lantana, Parthenium and Ipomoea are weeds only for revenue earning Forest Departments of the government. For poor households, who have no lands of their own, weeds growing on public lands are extremely useful, because of the very fact that they are not wanted by the modern sector of the economy. Once they acquire an economic value, they will go out of their hands —like bamboo, which was for long described as a weed by foresters.

Thus when a patch of barren land is planted with eucalyptus, even the weeds are no longer available to poor, landless households and their fuel crisis intensifies. Not surprisingly, foresters all over the country complain that women even take away dry eucalyptus leaves from eucalyptus plantations for use as fuel, thus, destroying any chance of the leaves breaking down into humus and enriching the soil. But what else can these energy-starved women do?

Thus what we see in India today is a growing conflict over the use of natural resources and, in particular, over biomass between the two sectors of the country's economy: the cash economy or the modern sector on the one hand and the non-monetized, biomass-based subsistence economy, the traditional sector on the other.

As the growing stock of biomass goes down, the demand for biomass from the cash economy goes up and demand begins to exceed supply, and pressure to exploit the remaining biomass increases enormously; biomass prices rise, and destructive processes accelerate because of sheer, market forces. Illegal timber felling is today a major activity in the country undertaken with the full support of political interests. Stealing a few dozen trucks of timber is the surest and easiest way to become rich. No less than a Chief Minister recently had to resign because of his family's involvement in timber smuggling.

As even those forms of biomass that are used by the poor become commercialized, the access of the poor to those biomass sources gets automatically reduced because of limited purchasing powers. The trend towards commercialization of firewood has been so rapid in the last 15 years that it is now rare to find poor households using much firewood, especially in the shape of logs. Firewood is no longer a fuel of the poor but of the relatively rich. The poor now subsist on qualitatively inferior sources of biomass fuels: crop wastes, weeds, twigs, cowdung and whatever organic *kachra* that they can find. In fact, if one goes to a village, one will see that even firewood, crop wastes and cowdung are fuels used according to the family's economic status—crop wastes usually being at the lowest of the order.

Unfortunately, several scientific agencies, thinking that 'crop wastes' are actually wastes, have begun to undertake research on commercial utilization of crop wastes. Technologies like fuel briquetting plants and small-scale paper mills based on crop residues are being heavily promoted by the government. This raises prices of fuel and fodder and directly hits poor landless peasants, who now have to rely heavily on the mercy of landed farmers to allow them to take these wastes away, which they will do only as long as they are non- commercial entities for them.

In fact, in many parts of Haryana and Punjab, farmers are already insisting that crop wastes be taken by their labourers in exchange for wages. In one district of Haryana we found that a common practice now is to let a woman pick an acre of cotton in exchange for the cotton sticks from that acre. There is no additional payment. The commercialization of biomass and its drain towards those who have the power to purchase will inevitably harm the poor and erode the non-monetized, biomass-based, subsistence economy.

ENVIRONMENT AND WOMEN

The destruction of the environment clearly poses the biggest threat to marginal cultures and occupations like that of tribals, nomads and fisherfolk which have always been heavily dependent on their immediate environment for their survival. But the maximum impact of the destruction of biomass sources is on women. Women in all rural cultures are affected, especially women from poor landless, marginal and small farming families. Seen from the point of view of these women, it can even be argued that all development is ignorant of women's needs, at best, and anti-women, at the worst, literally designed to increase their work burden.

Given the culturally accepted division of labour within the family, the collection of household needs like fuel, fodder and water is left to women. As the environment degrades, and this becomes increasingly difficult to obtain, women have to spend an extraordinary amount of time for foraging for fuel, fodder and water in addition to household work, agricultural work and caring for animals. There is almost no data which shows how the time spent by women on their daily household activities is increasing and how this increase differs across different eco-climatic zones of India. But the available data on the existing work burden is downright shocking. In many parts of India, women work for 14 to 16 hours everyday and it does not matter whether they are young, old or pregnant and whether it is a Sunday or any other holiday. Day after weary day the routine repeats itself and year after weary year fuel and fodder collection time periods increase. In many parts the women may have literally reached their 'carrying capacities'.

The worst situation is in the arid and semi-arid parts of the country and in the hill and mountain villages. In all these areas trees and forests have been steadily destroyed. On account of a number of factors—soil and climatic conditions, small size of land holdings, lack of irrigation, etc.—the Green Revolution has not reached these areas whereas in Punjab and Haryana, though trees are few, the Green Revolution has brought an enormous increase in biomass from crop lands. As a result, there is now an acute biomass famine in these areas. In all such areas women can spend as much as 5 to 6 hours every day, in some households even 10 hours every day, just collecting fuel and fodder. On the contrary, in a state like Kerala, where eco-climatic conditions permit a rich green cover, the work burden on women is much smaller—probably the least in the country. Even the minimal land reforms in which landless families have been distributed 1/10 of an acre, has meant access to a few dozen coconut trees, which helps to provide at least half the fuel requirements.

But in the rest of the country, with deforestation, the increasing work burden on women is affecting everything else in their lives. A study by the Indian Institute of Management in Ahmedabad shows that men who seek treatment at primary health centres are five times more than women. Women do not have time to seek health care even when they are ill. A study by the Operations Research Group found in western U.P. that even pregnant women work for 14 hours a day. They do this almost till a few hours before the delivery and begin normal work 3-4 days thereafter. One woman told the ORG researchers: 'We are too much loaded with family chores. Hospitals, injections, etc., are too much time consuming business for us'.

Another study from rural Punjab recently described the problems faced by poor woman after the tubectomy operation. Nine out of ten women from agricultural labour households in the village who had undergone tubectomy complained about post-operative pains. All of them wanted to take rest but none of them could. Collecting fodder alone took three hours. There was hardly any source of freely available fodder in the village. Most women had to bring grass and other weeds from between wheat plants in the fields. Many farmers would not allow this and landless women had to go from one field to another. Firewood meant still more work and another journey. The bending and stretching increased the pain. The women wanted to pass on their work to others, especially their children. They then ran into conflicts with their husbands and their children who wanted to play rather than work. One woman kicked and punched her daughter so hard for not working with her that she died. Such viciousness may be rare but increased family tensions are common place.

The penetration of the cash economy is affecting the relationship between the men and women in a peculiar way and is creating a real dichotomy in their respective relationships with nature. Men have become more involved with the cash economy than women. Women continue to deal with non-monetized, biomass-based subsistence economy of the household. Even within the same household, we can find cases of men happy to destroy nature to earn cash even though it would create greater hardships for the women in collecting daily fuel and fodder needs.

The Chipko Movement has given us numerous examples of this dichotomy in male-female interests, and the role of the women in preventing deforestation has been paramount in the movement. Even the Chipko experience with afforestation confirms this dichotomy between men and women and stresses the role of women in ecological regeneration. Even though many crucial household needs could be met by rehabilitating the local village ecosystem—by planting fuel and fodder trees, for instance—the men do not show any interest in doing so. It is women who are doing all the afforestation work organized by the Chipko Movement.

The new culture created by the penetration of the cash economy has, slowly but steadily, psychologically alienated the men from their ecosystem. Employment for them means work which can bring cash in their hands. This employment can be found mainly in the city and hence, mass male migration. Even when the men are in a village a job is still something that must earn cash.

There are few of those caste and class barriers in the Himalayan villages which prevent people from working together as a community to do community work. But still women continue to walk miles and miles over arduous paths to fetch fuel, fodder and water everyday, while men sit idle without doing anything to plant trees in the denuded areas around them.

It is not surprising that the eucalyptus based social forestry, trotted out to be such a great success by the World Bank and the forest departments, is all in the hands of men, all planting trees with the cash motive. Other than employing women as cheap labour in nurseries, these agencies have nothing to show in terms of involvement of women—the very people who deal with fuel and fodder and the government too still gives this the name of Social Forestry. But maybe this should not be surprising. Making a fast buck, even at the expense of society and ecology, is probably the most social thing we can do in a cash economy.

Male migration—another major phenomenon in modern society—also increases the work burden of women, who then have to take care not only of household needs but also have to devote more time to the family's agricultural fields. But as the time needed to collect fuel and fodder grows, agriculture gets neglected. A study of three villages in the Kumaon region of Uttar Pradesh, for instance, shows that the ratio of human energy spent in collecting fuel and fodder is already

2.5 times more than the energy spent on agriculture. As time for fuel and fodder collection grows and firewood becomes scarcer, the traditional practice of manuring fields will be given up. Cowdung will be used as fuel, as in the plains, but with the lack of manuring, these fragile soils will be exhausted very soon. It will be a disastrous situation both for the local people and the environment.

I recently came across another study which makes the same point. This is a study on Ratnagiri district, a major source of male workers for the city of Bombay. Ratnagiri is one of the few districts in the country where the sex ratio is in favour of women. It has far more women than men. Says Rajani Desai who conducted the study: 'the women do many of the men's jobs in the villages, or they learn to manage without the fruits of such labour. Thus, land must somehow be tilled or allowed to lie fallow. The cultivable waste is as high as 21 per cent of the total land under cultivation (according to the agricultural census, 1970-71) whereas it was 3.7 per cent for Maharashtra as a whole. But the wonder is that it is not far higher for, as we found with interview after interview, land cultivation was having to be less intensive (than before and than desired), or even abondoned, because manpower (more accurately, female power) in families was inadequate'.

Because of the increasing intensity of floods, there has been considerable talk in recent years about integrated watershed management in the Himalayas and in the Ghats. The Himalayas are being described as one of the most threatened ecosystems in the world, which in turn determines the fate of several hundred million people in the Indo-Gangetic plains. But if any action for ecological reconstruction has to be taken in the hills, it cannot be done without the involvement of women. The census data of 1981 shows that all the districts in the country which have high rates of female work participation are situated in the Himalayas or in the Ghats. In the Himalayas most women workers are also classified as cultivators. Therefore, any programme which aims at ecological rehabilitation in these areas will have to involve heavily overworked women, unless, of course labour is brought into these areas from outside, which will create tensions of another kind.

Fortunately, the experience of the Chipko Movement shows that women in these parts, despite their 14-16 hour back-breaking work schedule, are extremely keen to participate in such work, especially in tree planting. Once the women are organized and mobilized, they work with great keenness and they fight any obstacles that may be created by men, and as a result, some of the highest tree survival rates in afforestation efforts are obtained. It has also been found that when women get involved in afforestation, they tend to demand fuel and fodder trees, trees which can meet household needs, whereas men demand trees that can generate cash. The biggest ally in the demand for an ecologically and socially sound nature is, therefore, womankind.

As exactly similar experiences have been noted in East and West Africa, in Kenya and in the Sahelian countries, there is every reason to believe that this differential interest in nature between men and women is cross-cultural in character. Male trees and female trees is now even becoming something of a jargon amongst those interested in involving communities in afforestation.

All this should not be taken to construe that poor rural households do not have any need for cash. The unfortunate thing is that much of the cash generated by the male does not get spent on household needs. A reasonable proportion of this cash gets spent on products like alcohol and tobacco and artefacts of modernization like transistor radios.

This situation is creating a new demand on the time of the poor women and in some cases, it is resulting in a new militancy against nature. Women now have to go out and also earn some cash. Millions of rural women today sell firewood in the towns and cities. If we look at the quantum of firewood consumed in the cities, we can say that at least 2-3 million people must be doing headloading—bringing wood on their heads to sell in the towns—making the firewood trade the largest employer in the commercial energy sector of the country. Surveys show that selling firewood is a profession that has grown rapidly in the last 10-15 years with the growth in landlessness and joblessness. Most of these headloaders are women, and mostly tribal women. Selling firewood is back-breaking work and brings extremely little money. But the women do this because they cannot rely on their men to bring any cash back home. The big advantage with headloading is that this work is generally available round the year. So when no other work is available, headloading at least provides some income.

The life of the headloaders of Ranchi shows how difficult this entire business of headloading is. The women wake up early in the morning, at about 4 a.m. and soon after they begin their trek to the forest. On reaching the forest, some 8-10 km away, they begin collecting firewood. By the afternoon, having collected the firewood, they do not return home but go off to Ranchi on a train. They spend the night at the Ranchi railway station, which these days is an extraordinary sight. Then early morning they sell the wood, a load of some 20-25 kg. For this entire load they get Rs. 5-6, a third of which they lose in bribing the forest guard on a fixed weekly rate and the train conductors who allow them a free ride. With the remaining money, the women buy some salt, kerosene for lighting and other vital household necessities and return home. That evening they cook food and eat the first freshly cooked meal in two days. Next morning the two day cycle begins afresh.

Every headloading woman knows that the forests will be soon destroyed and even this horrible occupation will come to an end. But they are afraid that if they do not take advantage of the forest now, the foresters will sell it off to a contractor soon. The forest departments are extremely keen to get headloading banned. They have made no study of the phenomenon of headloading. They have not made any plans to meet the firewood needs of the cities. They have obviously not made any effort to connect the two issues. Foresters have become environmentalists. They say that these women destroy young trees, lop trees, excessively; therefore, ban them. No wonder forests are a major issue in most tribal agitations.

If we take a head count at this stage, we will find that the destruction of the environment and its transformation is already affecting on an immediate and on a daily basis at least the following groups: artisans, nomads, tribals, fisherfolk, and women from almost landless, marginal and small farming households. These groups add up to no less than half to three-quarters of the country's entire rural population. And unlike the situation in the West, the question of environmental destruction is not an issue related to quality of life but it is a question of survival.

TOWARDS HOLISTIC MANAGEMENT

If these be the problems, then what do we do about them? First of all, there must be a much more holistic thinking regarding the management of our land and water resources. And this will not be easy, unless a determined effort is made. For all the talk about the need for a scientific temper, it must be recognized that the current methodology of scientific analysis carries within itself an extremely unscientific practise, that of, reductionism. It is this reductionist approach that has today produced both natural and social scientists who know more and more about less and less: who know how to cure a disease but create another disease in the process. Ecology is the first scientific discipline that has actually forced people to integrate and not reduce.

Let me illustrate this by describing what is happening to the three major components of our land: our forest lands, our crop lands and our grazing lands.

The destruction of forests has a major impact on the productivity of our crop lands. This happens in two ways. Soil erosion increases manifold and the soil literally gets washed, leading to an accentuated cycle of floods and droughts. But equally important is the impact of the shortage of firewood on the productivity of crop lands. When firewood becomes scarce, people begin to burn cowdung and crop wastes. In many places cowdung and crop wastes are now the major sources of cooking energy. Thus, slowly every part of the plant gets used and nothing goes back to the soil. Over a period of time, this nutrient drain affects crop productivity. Add to this, the technology of the Green Revolution: the technology of growing high-yielding varieties on a limited diet of chemical fertilizers like nitrogen, phosphates and potash. The total biomass production goes up and so does the drain of the nutrients from the soil. Plants need some 25-odd elements to grow, not just N, P and K. They keep taking out these nutrients from the soil and the more intensive the agriculture, without any manure and crop wastes going back to the soil, the faster is the nutrient drain. Today, the district of Ludhiana has the highest yields of many cereals but it has also the highest deficiencies of many micro-nutrients in its soil. In Punjab, many farmers have begun to use zinc routinely as a fertilizer. Soon it will be sulphur, manganese and iron deficiencies. The micro-nutrient fertilizer industry, already a Rs. 10 crore industry, is definite to become the boom industry of the future. But the net result is that Indian agriculture, because of this and many other factors, all of them mostly related to ecological factors, is showing a consistently declining trend in output when compared to the rapidly rising levels of inputs.

If existing crop lands and irrigation water resources are not used well, then faced with a rising population, the demand for colonization of marginal lands for agriculture will grow. As large parts of the country have excellent soils and enormous sunlight and the only shortage is of water, government programmes have also promoted the cultivation of marginal lands, especially through spread of irrigation. Fortunately, the rate of expansion of the cropped area has now come down as compared to the 1950s and 1960s but enormous ecological damage has already been done. Even more than forest lands, crop lands have expanded on to grazing lands. The result is that graziers have been pushed on to lesser and lesser grazing lands. This has in turn led to the overstocking of grazing lands, destroying their productivity and impoverishing the graziers in the process.

The graziers have taken recourse to two strategies in such a situation. As the environment becomes more and more hostile, they get rid of the more vulnerable cattle and start keeping goats. The number of goats in Rajasthan has expanded dramatically —much faster than any other livestock. Environmentalists may howl that the goat is highly destructive of the environment but it is a far better suited animal to the hostile environment that we human beings are creating in Rajasthan, Gujarat and Maharashtra. It makes economic sense for the grazier to reduce his risk during a period of drought, which is common in these areas.

The herders try to solve their problem in yet another way: they begin to use forests as grazing lands. This infuriates foresters who see goats and cattle as the worst evil ever devised. It is true that India's forests are among the most heavily grazed forests in the world. As forests are now disappearing in Rajasthan and Gujarat, nomads from these states now enter Madhya Pradesh in large numbers, still a heavily forested state.

The foresters in Madhya Pradesh, threatened by this invasion banned these 'foreign' invaders but the Supreme Court struck down the ban saying that Indians cannot be restricted from going from one state to another. So the inter-state movement goes on but clashes are accelerating. The foresters killed 5,000 sheep in one extremely brutal event on the M.P.-Rajasthan border last year and local politicians rushed to rouse passions against these nomads, and made every effort to break down the highly synergistic relationship that once prevailed between the nomads and the settled farmers. The nomadic animals would bring manure to the fields of settled farmers. Like a walking vaccum cleaner, these animals would gather nutrients from all over and dump them on to the farmers' fields where they would rest and the nomad would even be paid for this service. But today there is open hostility.

M.P.'s forest secretary recently wrote an article in the *Times of India* saying: 'For the love of Mike, please keep these animals out of our forests'. If only the animals could be kept out, the forests would regenerate themselves. But such despair is no answer. Animals cannot obviously be kept out without creating extraordinary conflicts.

Meanwhile, however, the foresters have found an ingenious solution: plant trees like eucalyptus which cannot be browsed by animals. Eucalyptus is loved by foresters exactly for this reason. There are many who doubt the ability of eucalyptus to produce more wood than many indigenous species. But it is indeed ironic that when the country faces an acute fodder crisis, the forester can only plant eucalyptus and produce non-browsable biomass, that is, we must do exactly the opposite of what the people need. In fact, eucalyptus is the true weed from the point of view of the landless. It is non-browsable like all fast-spreading weeds and does not benefit the poor unless they own land.

But in this manner the cycle of destruction is complete. The forest departments have destroyed forests by selling off timber to the industrial and urban interests. The firewood shortage and the resulting soil erosion is keeping the productivity of Indian agricultural lands low. Crop lands have expanded on to marginal lands and have reduced grazing lands. Animals have moved into forests and are preventing regeneration. All the chickens are coming to roost. Meanwhile as landlessness and joblessness grow, even groups like the tribals who from times immemorial have lived in total harmony with forests are turning against forests and want to sell them off as fast as they can.

Experts sit in grand isolation. Foresters have no interest in fuelwood or in crop lands. Agricultural experts have no interest in animals or in grazing lands. Animal husbandry people never tell foresters that they must produce fodder banks.

In the life of the proverbial last man of Gandhi—or as I would prefer, the last person—all this isolated thinking brings havoc. Life for the poor becomes terrible. Finally, even nature turns against itself. Once denuded, the high solar energy and temperatures—the very factors that can bring high productivity and high prosperity—begin to bring high desiccation, erosion, destruction, and social and ecological poverty. FAO figures show that the effect of unchecked soil erosion on soil productivity is one of the highest in the world given the ecoclimatic conditions of South and Southeast Asia.

IMPROVING THE COUNTRY'S GROSS NATURE PRODUCT

Nothing could be more important for planners and politicians today than to rebuild nature. But this can only be done if we re-establish a healthy relationship between the people and their environment. Then only a nature that is useful to the millions, not for making millions can be re-established. Regardless of what happens in the West—its electronics revolution, its biotechnology inventions, its communications satellites, its efforts to mine the oceans and its efforts to build solar cells and wind mills—and regardless of how much we may want to catch up with the West in the name of modernization, rebuilding nature and rebuilding its relationship with the people will remain the only way to solve the problem of poverty and possibly even unemployment. With some 100-150 million hectares of waste and near-waste lands and with the crying need to produce biomass, this country can never get a better opportunity to harness the power of its people to the power of its land, to strike at the roots of landlessness, poverty and unemployment, all at the same time.

If enough biomass was available, poverty, that is, lack of cash, as defined by economists and by the modern civilisation, will not disappear. But definitely the rigours of poverty, the increasing susceptibility to natural emergencies like floods and droughts, and definitely the *increasing* rigours of poverty will be arrested by creating more biomass. In fact, conventional measurements of poverty based on income data or on food calories are clearly *inadequate* in a situation where the rest of the biomass needs are becoming increasingly difficult to meet and collecting them on a daily basis constitutes the worst (and growing) drudgery humankind, especially womankind, has ever known. These calculations are not only just inadequate but they also reflect a strong gender bias because they deal mainly with those aspects of poverty (lack of cash) that the male is generally concerned with but not with those aspects of poverty that the woman deals with (lack of fuel, fodder, water, etc.).

If we were to construct a concept like Gross Nature Product, we would find that for the poor it is this indicator which is many times more important than the conventional Gross National Product. In fact, we can even say that those who do not get much from the conventional GNP—the poor—are the ones who are most critically dependant on the Gross Nature Product. The Gross National Product cannot be allowed to destroy or transform the Gross Nature Product.

The economists get very worried about the structure of the Gross National Product. It is equally important, if they have the poor in mind, to get worried about the structure of the Gross Nature Product. It is not just the quantity of biomass that is important for meeting basic household needs but also its diversity: sources of biomass within any village ecosystem must be diverse enough to meet the diverse household needs of fuel, fodder, building materials, etc., and of artisans. The diversity in nature has also acted as an insurance during periods of emergency by reducing societal vulnerability. During periods of drought and resulting crop failures, which are recurring phenomena in many parts of India, roots, leaves and wild animals in the forests, generally become an important, alternative source of nutrition. In 1983, the tribals of Chotanagpur survived a drought not because of government assistance but despite government callousness. It is the forests which gave them their nutrition. Surviving on the forests during a drought is common in Bastar. A study from Africa found that in times of drought, traditional societies had nearly 150 responses. They even fed the thatch of their huts to the goats. But in a modern village there were only two responses: prayer to God (which even the Tamil Nadu government recommended during the Madras water crisis) or migration to the towns. The combination of trees, grasses, crops, animals and ponds, which we found in almost every village was an extraordinary interactive and resilient system to emergencies. Instead of destroying this complex and inter-related system, science must be used to build on it.

In other words, it is not enough to preserve biological diversity in just those areas of our country where the flora and fauna are genetically rich and diverse by setting up biosphere reserves and national parks, but that biological diversity must be preserved and/or recreated in every village ecosystem. Concentrating on the production of a few commodities (cereals, for instance) is totally inadequate in a society which is only partly monetized and where the vast majority still have to depend on access to free biomass resources from the immediate environment. Every village has to become a biosphere reserve.

Understanding of the Gross Nature Product and how it is changing within the national ecological space (or shall we say, national economy) is extremely limited, despite its crucial importance for the poor. We know nothing for instance, about the importance of the so-called weeds. The reason we know so little about the Gross Nature Product is because the 'growing stock' of biomass does not get reflected in Gross National Product calculations anywhere. Therefore, whether the 'growing stock' lives or dies, exists or disappears, does not make any difference to economists. Most economists, not surprisingly, have no clue of what happens to a subsistence economy when its biomass resources are affected. The growing hardships and tensions only get reflected in studies of 'political economy' which record growing conflicts over land, forests, fodder, grazing lands, water sources, etc., or in totally unexpected indicators like the sex ratio of the country. Just why did 22 million women fail to show up in India's 1982 census is anybody's guess. Surely their extraordinary work burden, in a situation of malnutrition, must be an important factor.

It is for this reason that an indicator like Gross Nature Product, and changes in that indicator, would probably reflect far better the changing reality in the substance sector of a country like India. Unfortunately we do not know as yet how to construct such an indicator. But I am sure if we did, we will find that while the conventional GNP has gone up, the Gross Nature Product has steadily gone down, the former acting as a parasite on the latter.

The answer to India's immediate problem of poverty lies in increasing the biomass available in nature and increasing it in a manner that access to it is ensured on an equitable basis. But giving a 'green cover' to the country—the real Green Revolution—would probably require the most holistic thinking that planners, economists and scientists have ever known. The conflicts and complementarities in the existing land-use patterns have to be extremely well understood. Otherwise land-use patterns will continue to be chaotic. Poorer peasants will continue to oppose planting trees on community lands under the so-called social forestry programmes because they are afraid this will take away their grazing lands. Forest departments and richer peasants will only plant those trees which animals cannot (like eucalyptus) even though there is a stark fodder crisis all around. Nothing could take us close to Gandhiji's concept of gram *swarajya* than striving to create village ecosystems which are biologically diverse and self-reliant in their local biomass needs to the maximum extent possible. This will clearly demand an extremely intensive use of our natural resources like land and water to create a huge and diverse growing stock of biomass. Any science which teaches how to do this will truly have the right to be called a people's science—and indeed it will have to begin with the knowledge of the people.

An even bigger challenge is before social workers and workers and politicians who have to play a crucial role in ensuring that people can participate in this biomass-based development process. No biomass-based strategy can succeed without the involvement of the people, especially women, without whom this work cannot be done.

The role of women in recreating a healthy and useful environment cannot be overstressed.

Immediately, at least, the country must recognize that a clear biomass policy is desperately needed, which recognizes the competing uses for biomass in society, especially between biomass-based industry and poor households and sets clear priorities on the use of biomass in a situation of scarcity. The needs of the poor must be specified as a priority use of biomass in the existing situation of environmental degradation.

If we fail to recreate nature on a massive scale in a manner that generates employment and equity, not only our villages but also our cities will become unlivable. Many people prefer to call the urban migrants economic refugees from the countryside—to my mind, many of them are really ecological refugees, displaced by dams, by mines, by deforestation, by destruction of grazing lands, by floods, by droughts, and what not. We are today the world's fourth largest urban population. Before the end of the century we will be the largest. Managing this huge urban population will call for extraordinary political and managerial sagacity, something we cannot learn from the rest of the world. But one thing is definite, if the process of urbanization continues to create the same demands on our rural environment it will only accelerate the destruction of the rural environment and in turn make the urban environment impossible to manage. India cannot survive without a low-energy, low-resource input urbanization. In its absence, no law or laws which try to turn the incoming ecological and economic refugees into our cities into criminals will work. Barbara Ward told the Stockholm Conference that if ecology teaches us anything it is that we have only one earth, in which everything is related to everything else. I am today tempted to paraphrase her: we, too, have only one nation, where everything is related to everything else. Only a holistic approach to our problems will work.